भारतीय मानक
*Indian Standard*

**IS 7889 : 2023**

# कंपन गैल्वेनोमीटर — विशिष्टि

*( पहला पुनरीक्षण )*

# Vibration Galvanometers — Specification

*( First Revision )*

ICS 17.220.20

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Measuring Equipment for Basic Electrical Quantities Sectional Committee, ETD 12

## FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Measuring Equipment for Basic Electrical Quantities Sectional Committee had been approved by the Electrotechnical Division Council.

This standard was first published in 1975. This revision has been brought out to bring the standard in the latest style and format of the Indian Standards.

Vibration galvanometer is mostly used to measure a small quantum of alternating current or as a null detector in a.c. bridges. It consists of a strong permanent magnet with a moving coil suspended in its field. The moving system carries a small mirror which reflects a beam of light over the scale. Light spot on the scale is provided with a vertical hair line. The vibration galvanometer may either be with built-in lamp and or be used with a separate lamp and scale arrangement placed at a distance of one metre.

Vibration galvanometer has a fixed resonance frequency where it gives maximum band of light on the scale. The galvanometer is tuneable to ± 1 Hz. A mechanical zero adjustment is also provided on the galvanometer. This edition does not include any significant technical changes with respect to the previous edition.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the results of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

# VIBRATION GALVANOMETERS — SPECIFICATION

*( First Revision )*

## 1 SCOPE

This standard specifies requirements and tests for a.c. vibration galvanometers.

## 2 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply:

**2.1 Galvanometer** — An instrument intended for measuring or detecting currents that are usually very small.

**2.2 Vibration Galvanometer** — A galvanometer in which the natural period of vibration of the moving element may be adjusted so that it is equal to that of the current which is being measured or indicated.

**2.3 Magnetic Shunt** — A piece of iron designed to carry part of the flux of a magnet or electromagnet in a measuring instrument in order to control its action.

**2.4 Sensitivity** — The current in μA that shall be passed through the galvanometer in order to produce a deflection of 1 mm on the scale at rated frequency. In the non-built-in lamp and scale type, sensitivity shall be specified in terms of deflection of 1 mm on the scale placed at a distance of one metre from the galvanometer moving system at rated frequency.

**2.5 Galvanometer Impedance** — The impedance offered by the moving coil system at the terminals at its resonance frequency.

**2.6 Pointer** — An optical device a component of which (generally a mirror) is attached to the moving element so that its movement is indicated by a spot of light moving over a scale.

**2.7 Zero Shift** — The change in the rest position of the pointer from the zero position before and after the deflection.

**2.8 Resonance Frequency** — The frequency of the source to which the galvanometer is tuned to give maximum deflection.

**2.9 Rated Resonance Frequency** — Resonance frequency declared by the manufacturer.

**2.10 Type Tests** — Tests carried out to prove conformity with the requirements of this specification. These are intended to prove the general qualities and design of a given type of vibration galvanometer.

**2.11 Routine Tests** — Tests carried out on each vibration galvanometer to check requirements likely to vary during production.

## 3 GENERAL REQUIREMENTS

**3.1** The permanent magnet shall have high coercivity with the required flux density.

**3.2** The resistance wires used shall be suitable from the point of view of temperature coefficient, thermo-emf to copper and resistivity.

## 4 WORKMANSHIP AND FINISH

**4.1** All parts liable to rust shall be given a suitable corrosion preventive finish.

**4.2** The magnets shall be well aged.

**4.3** Paints, lacquers or any other material used for surface finish shall be hard and smooth so that clearing of accumulated dust shall be facilitated.

**4.4** Spring washers, lock nuts or similar devices shall preferably be used for fixing binding posts to ensure that they do not become loose in use.

**4.5** The case shall be so made as to prevent ingress of dust and other particles.

**4.6** Soldering and brazing shall preferably be done with a non-corrosive flux. When corrosive flux is used, it shall be completely removed. Soldered joints shall present smooth and continuous appearance. All excess solder and flux shall be removed.

## 5 RATED RESONANCE FREQUENCY

**5.1** The rated resonance frequency shall be declared by the manufacturer. The resonance frequency shall be adjustable over a range of at least ± 2 percent of the rated resonance frequency.

**5.2** If required by the purchaser, an externally accessible frequency adjuster may be provided.

## 6 SENSITIVITY

The manufacturer shall supply the sensitivity value with the vibration galvanometer.

## 7 MARKING

**7.1** The vibration galvanometer shall be marked with the following:

a) Manufacturer's name or trade-mark;

b) Type and the serial number;

c) Nominal galvanometer impedance;

d) Rated resonance frequency; and

e) Country of manufacture.

**7.1.1** *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

## 8 TESTS

### 8.1 General Conditions for Tests

Unless otherwise specified, the carried out under the following atmospheric conditions:

a) Temperature — 15° to 35°;

b) Relative humidity — 45 percent to 75 percent; and

c) Pressure — 86 Pa to 106 Pa.

### 8.2 Classification of Tests

The tests shall be classified as follows:

a) Type tests; and

b) Routine tests.

**8.2.1** *Type Tests*

The following shall constitute type tests and shall be carried out in the sequence given below:

a) Insulation resistance test (**8.3**);

b) High voltage test (**8.4**);

c) Sensitivity test (**8.5**);

d) Zero shift test (**8.6**);

e) Test for optical system (**8.7**); and

f) Test for resonance frequency (**8.8**).

**8.2.1.1** *Number of* samples *and criteria for conformity*

Type tests shall be applied to three test specimens, in the event of one specimen failing to comply in any respect, a set of further three specimens shall be taken all of which shall comply with the requirements of this standard.

**8.2.2** *Routine Tests* — The following shall constitute routine tests and shall be carried out in the sequence given below:

a) Insulation resistance test (**8.3**);

b) High voltage test (**8.4**);

c) Sensitivity test (**8.5**); and

d) Test for optical system (**8.7**).

### 8.3 Insulation Resistance Test

When the moving system is insulated from the body of the galvanometer, the insulation resistance between the two terminals connected together and the metallic body or case when measured at 500 V d.c. after one minute of electrification shall be not less than 100 megohms.

### 8.4 High Voltage Test

When the moving system is insulated from the body of the galvanometer, no breakdown, arcing or sparking shall occur when an a.c. voltage of 1 000 V (RMS) is applied across the two terminals connected together and the metallic body or case for a period of one minute.

### 8.5 Sensitivity Test

The sensitivity of the galvanometer when new as measured at one-fourth, half, three-fourths and full scale deflections on both sides of centre zero on the scale shall not differ by more than 5 percent of the stated value and shall not differ among themselves by more than 2 percent of the stated value.

### 8.6 Zero Shift Test

The zero position of the pointer shall be noted and the galvanometer given an a.c. current signal to cause deflection over the full scale. The signal shall then be removed and the zero position noted again. The shift of the zero position shall not exceed 0.5 percent of full scale reading in either direction.

### 8.7 Test for Optical System

The component(s) used in the galvanometer for use as optical pointer shall be capable of giving a clear and well defined hair line of the spot whose thickness is not more than 0.1 of the least count of the scale when tested using the associated lamp, scale etc.

### 8.8 Test for Resonance Frequency

A continuously variable frequency supply and a standard frequency meter or any other frequency measuring device shall be used for verifying the resonance frequency of the moving system.

NOTE — The full scale deflection in the case of lamp and scale galvanometer shall be 10º from either side of zero.

## ANNEX A

(*Foreword*)

## COMMITTEE COMPOSITION

Measuring Equipment for Basic Electrical Quantities Sectional Committee, ETD 12

| *Organization* | *Representative(s)* |
|---|---|
| Ministry of Communication and Information Technology, New Delhi | Shri R. P. Sondhi **(*Chairperson*)** |
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